MAC VALVES, INC.

DOCUMENT NUMBER

TITLE: MI/O-67 Manual for Web Configurator

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Overview

After reading these instructions, you will be able to configure and manually operate the valve stack manifold prior to interfacing with the PLC.

These actions will allow:

- You to demonstrate the system capabilities to the customer or end user.
- Machine builders to test the system in a manual and off-line setting.

Make sure you are using Google Chrome for your web browser.

In order for you to interface with the customer's PLC, you must first determine the IP address using the IP configuration software "IP Config," which identifies the proper IP address if it is not already known.

Once the correct IP address is determined, it is used to log into the Web Configurator Software Tool. This launches the software that allows manual operation of the valve stack manifold.

User's Manual

For

MI/O-67 Web Configurator and IP Configurator

11/15/2017

Table of Contents

1. Start Up

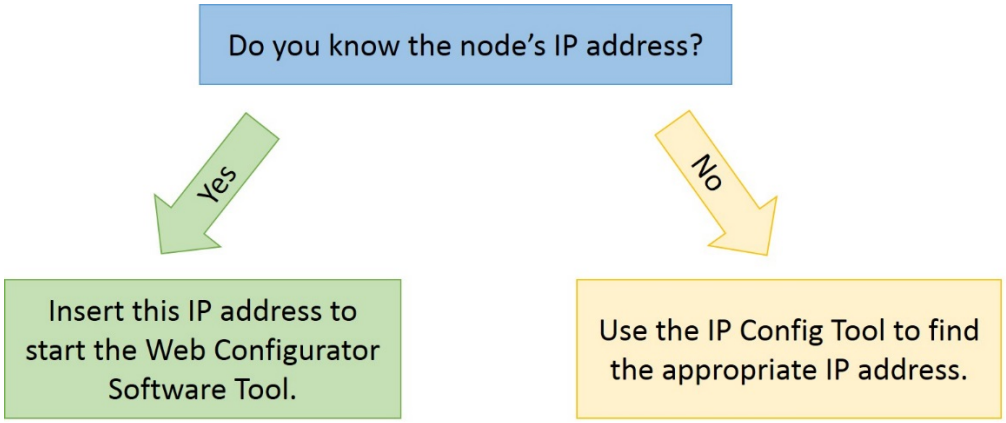
1.1 Which Tool?

When the product comes from the factory, it has a default IP Address set into the Comms Module (EtherNet front-end electronics) which allows the Web Configurator to attach to the module.

Use the IP Config software tool:

- If the IP address is not known.
- To set or re-address the IP address.
- When the IP address needs to be changed without the Web Configurator software tool.

Use this diagram to determine whether you need to use the IP Config software tool:

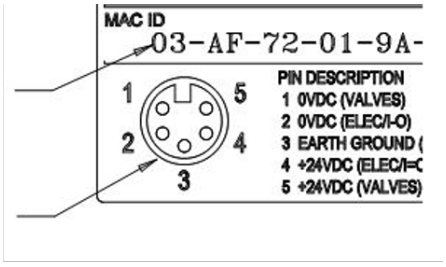


1.1.1 Module Label

Each Comms Module will have a label which shows the MAC ID for the EtherNet IP interface. It will also have the pin descriptions for the power connector. An example of this label is shown below:

MAC ID (Unique serial number for this comm module – always in hexadecimal format)

Pin Connector (power connector wiring)

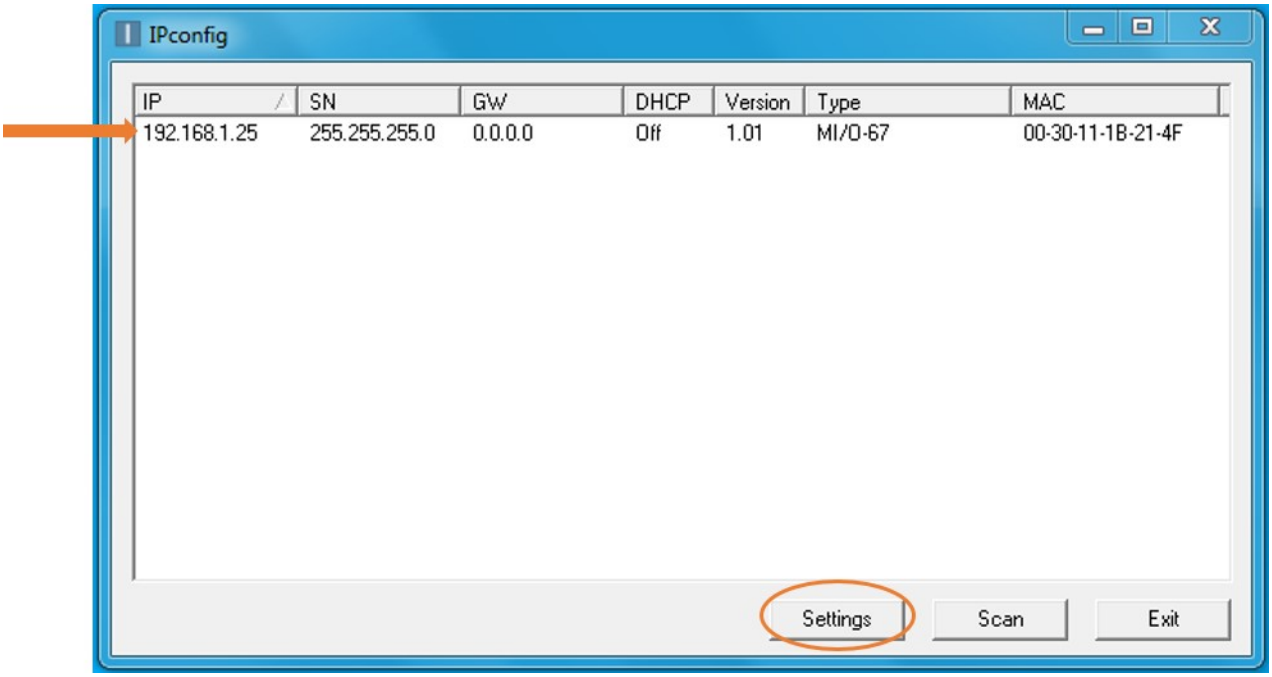


1.2 IP Configurator

To use the IP Configurator tool, first the software must be loaded onto the control computer. Also, the computer must be running on the same subnet mask as the target slave. This can be set up in the computer by going to the Control Panel section, selecting the EtherNet card in use, turning off the DHCP function, and setting the desired IP Address and Subnet Mask for the computer. (See Appendix B for this process.)

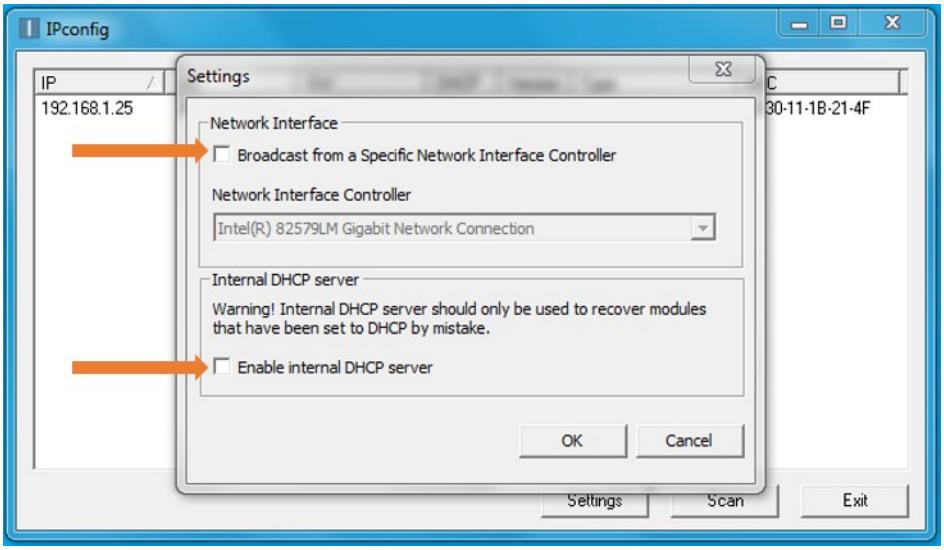
To load the software:

1. Connect the MI/O-67 stack to the computer's EtherNet port and power the unit up.
2. If the IP Configurator tool is not installed on the computer being used, download this application from the MAC Valves website, install it on the computer and proceed. If it is already installed, start the IP Configurator Application.
3. A screen will appear that shows the MI/O-67's IP address and MAC ID as shown below.
4. If the screen does not come up, check the computer's network configuration in the control panel.
5. Once a node (IP address) appears, select it by double-clicking on it.

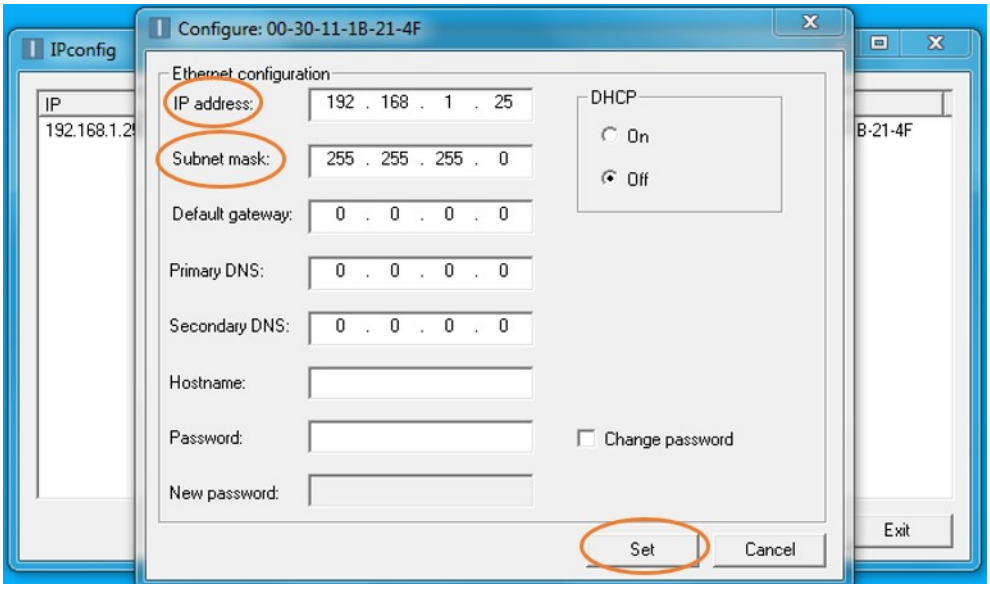


Note that if you click on the **Settings tab at the bottom of the screen, a **Settings** window will open.*

*The **Settings** tab allows you to select other (advanced) properties as pictured below:*



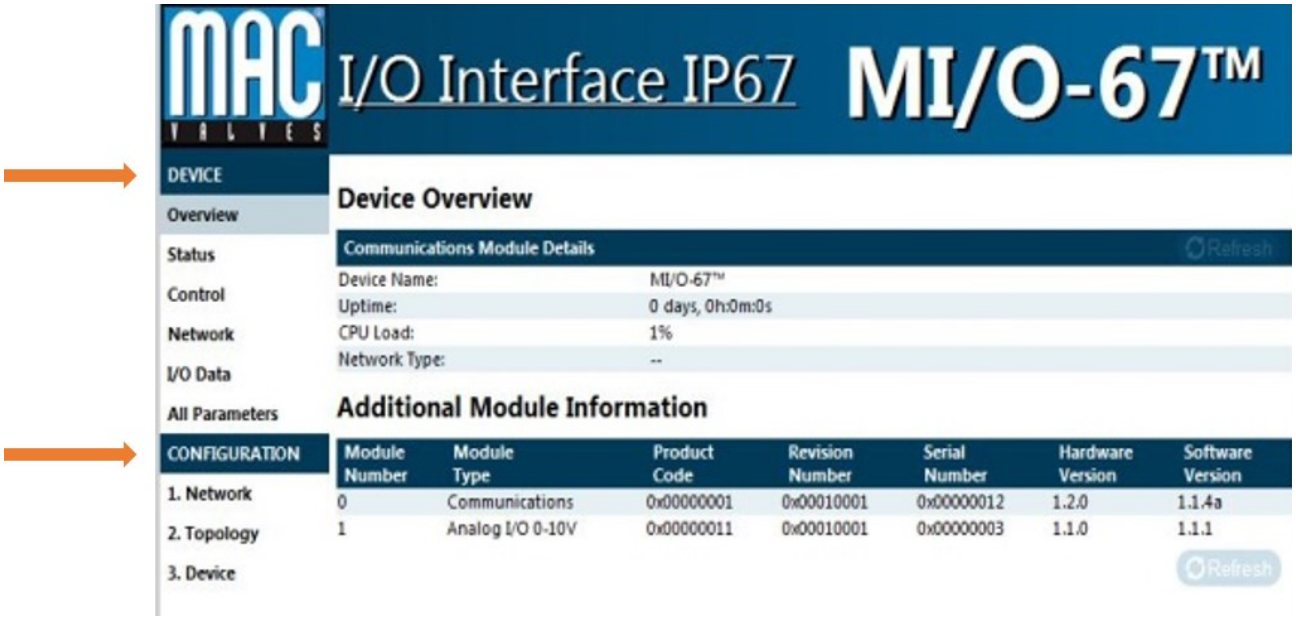
6. After you have double-clicked on the IP address, another screen will appear. On the top will be the IP Address and right below that will be the Subnet Mask Address:



7. Set these addresses to the desired numbers. Click on the **Set** tab at the bottom of the screen after changing any of the properties and they will be saved to the module.
8. The MI/O-67 is now ready to be installed into the network if further setup and offline testing is not needed.
9. Once the IP Address, Subnet Mask, etc., are set and saved to the MI/O-67, exit the tool and proceed either to the Web Configurator or connect it to a PLC and set it up according to the manufacturer's instructions. Refer to UI-174 for the MI/O-67 byte information.

1.3 Web Configurator Tool/ Device Overview Tab

Start by connecting the MI/O-67 to the control computer's EtherNet port and power the unit up. Next, start Chrome on the control computer and type in the MI/O-67's address (factory default is 192.168.1.25) into the web search line. A screen should appear that looks like the picture below (if nothing comes up, check the cabling, power, and the computer's EtherNet port.):



Screen Layout:

On the left side of the screen below the MAC Valves logo, there are two sections of clickable tabs (orange arrows):

- **Device Section**, with **Overview** (highlighted), **Status**, **Control**, **Network**, **I/O Data**, and **All Parameters** tabs.
- **Configuration Section**, with **Network**, **Topology**, and **Device** tabs.

Highlighting/selecting any of these tabs will reveal device or module information.

In the example above, the Device Overview tab is highlighted, and the information is divided into two sections:

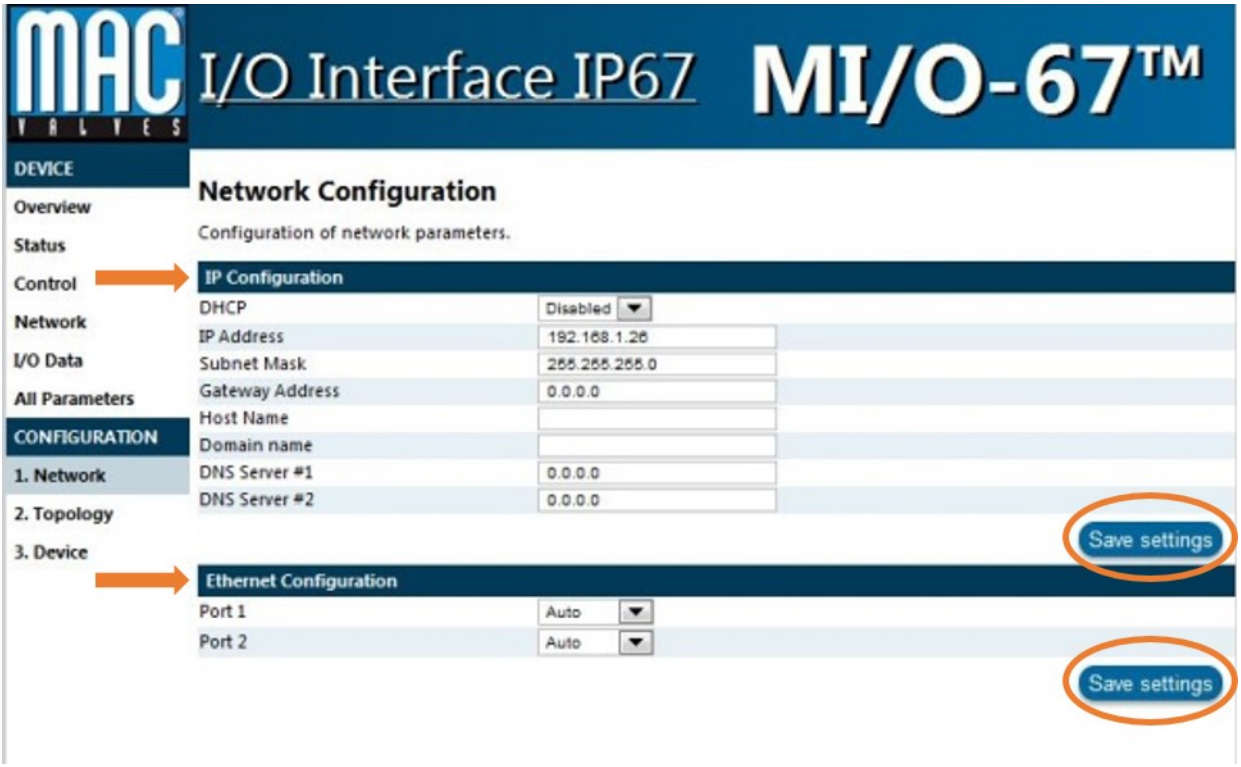
- The upper section contains the **Device Overview**, with Communications Module Details, such as **Device Name**, **Uptime**, **CPU Load**, and **Network Type**.
- The lower section contains **Additional Module Information**, such as the **Module Number**, **Module Type**, **Product Code**, **Revision Number**, **Serial Number**, etc.

For example, Module Number 1 is an Analog I/O 0-10V module.

1.3.1 Configuration Network Tab

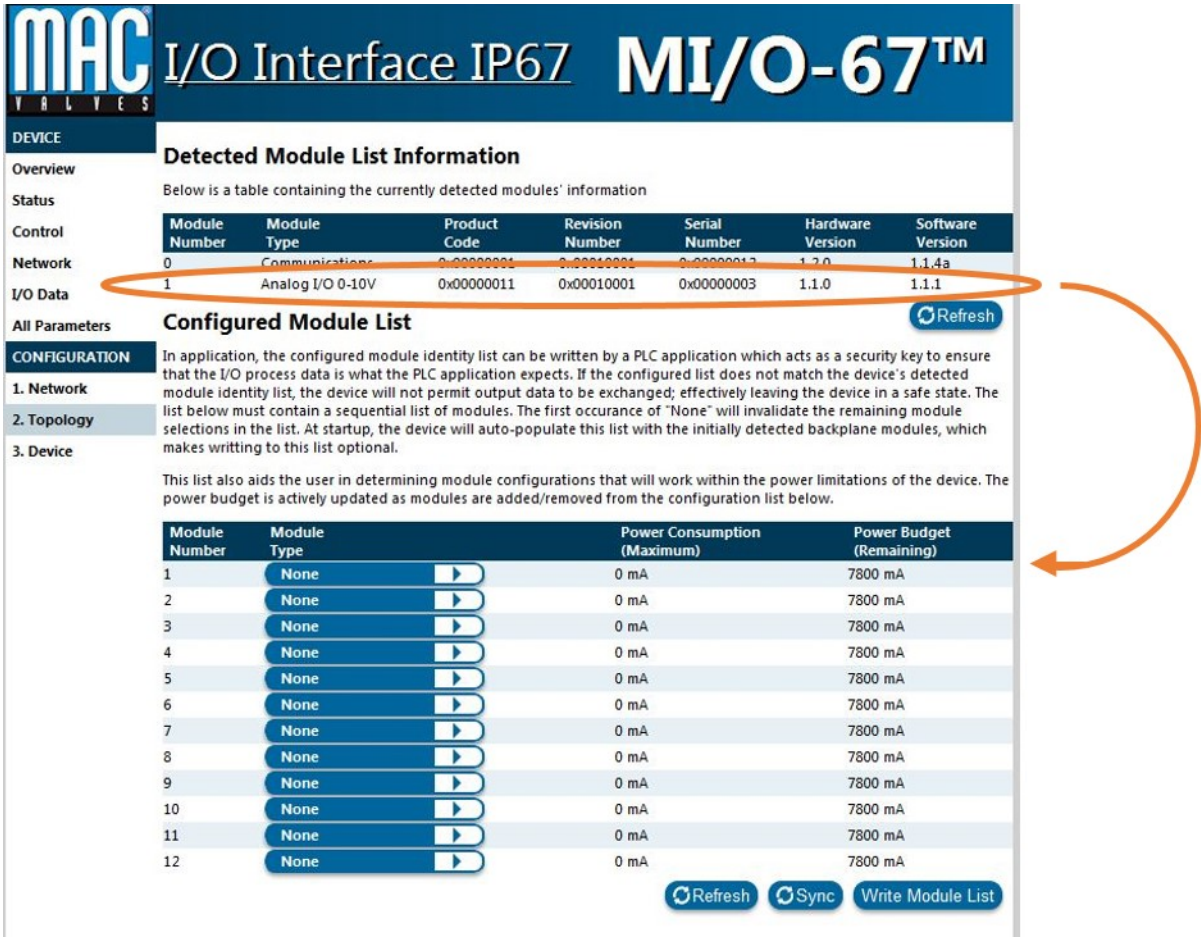
If you highlight/select the **Network** tab, the **Network Configuration** screen will appear, which shows both the IP and Ethernet Configurations for the network. The top section shows IP Configurations, such as: the DHCP, IP Address, and Gateway address. The bottom section shows Ethernet Configuration parameters, including port status (Port 1, Port 2).

If needed, any changes may be made through this window. Make sure to save any changes by clicking on the **Save Settings** button.



1.3.2 Configuration Topology Tab

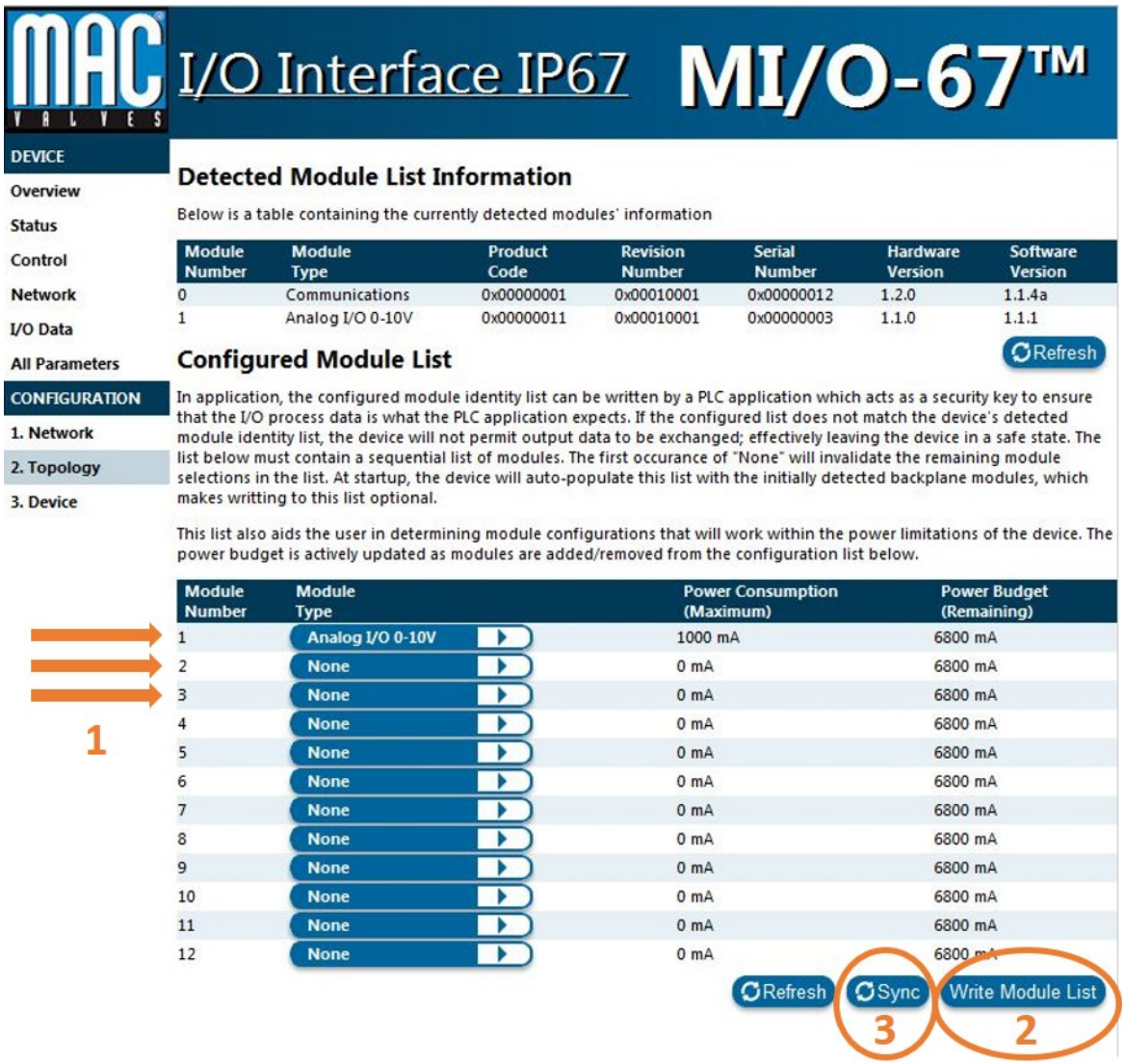
The next step is to load the module information into memory. Highlight/select the **Topology** tab. A window will appear, showing the stack and modules that have been read by the Configurator under the **Detected Module List Information** area of the screen. To load these items into memory, they must be selected in the **Configured Module List** area below.



Note – these must be selected in the proper order or no connection will be made. (Also note that Module Number 0 is **not loaded into the **Confirmed Module List** – the items that are loaded start with the number 1.)*

Click on the dark blue ovals in the **Confirmed Module List** to select the proper module number. This must be done for each item ***in order*** from the list on the top menu. In the example above, there is only one module that can be added: Module #1, Analog I/O 0-10V.

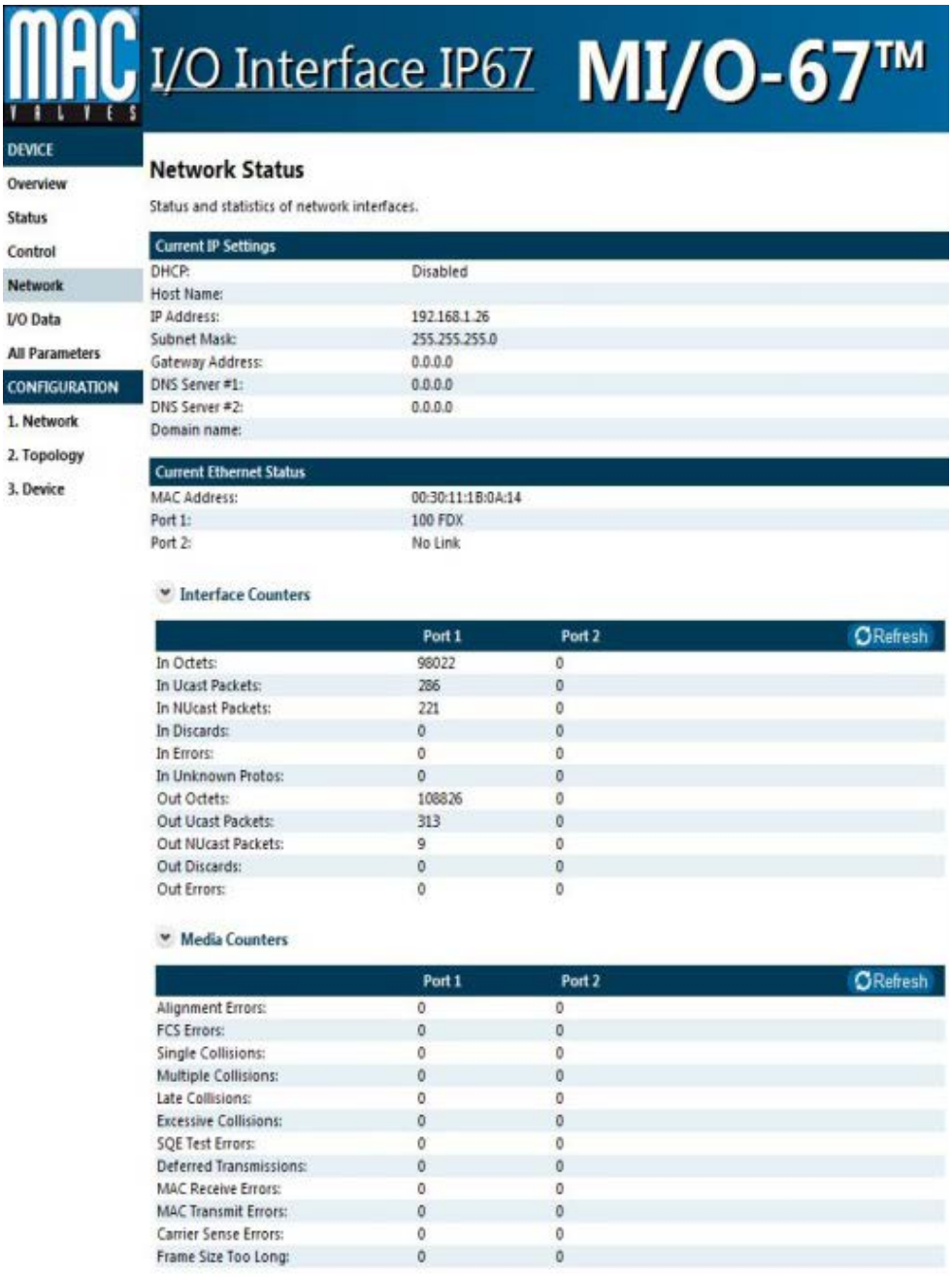
This example shows the stack with one module added: Analog I/O Module, Voltage:



Only after all of the modules (the entire group) have been added, click **Write Module List**, and then **Sync**.

1.3.3 Device Network Tab

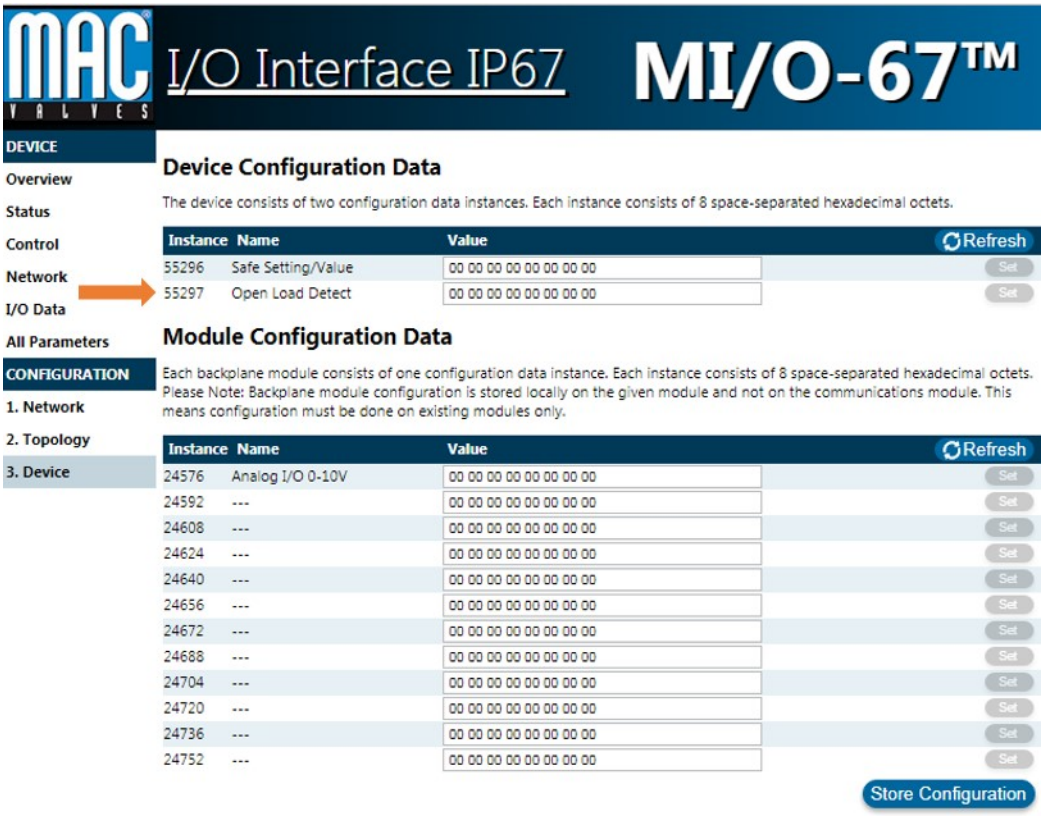
The **Device Network** tab gives EtherNet network status information as shown below:



This can be used for network troubleshooting if there is a connection problem.

1.3.4 Configuration Device Tab

The **Configuration Device** tab allows you to set the properties, such as **Open Load** and default settings to the modules:



From this tab, you can set the **Open Load Detect** function for the valve stack. To do this, using Instance Code 55297, set the valve channels for **Open Load Detect** by toggle high the channel(s) in question.

These are in hexadecimal format. Hexadecimal format is a positional numbering system in Base 16, using both unique numerals (0-9) and letters (a-f). Whereas 0-9 decimal would be 0-9 hexadecimal (written 0x0 through 0x9) 10 decimal would be hexadecimal a, 11 decimal would be hexadecimal b, 12 decimal would be hexadecimal c, 13 decimal would be hexadecimal d, 14 decimal would be hexadecimal e, and 15 decimal would be hexadecimal f. **(See Appendix A for conversion chart.)**

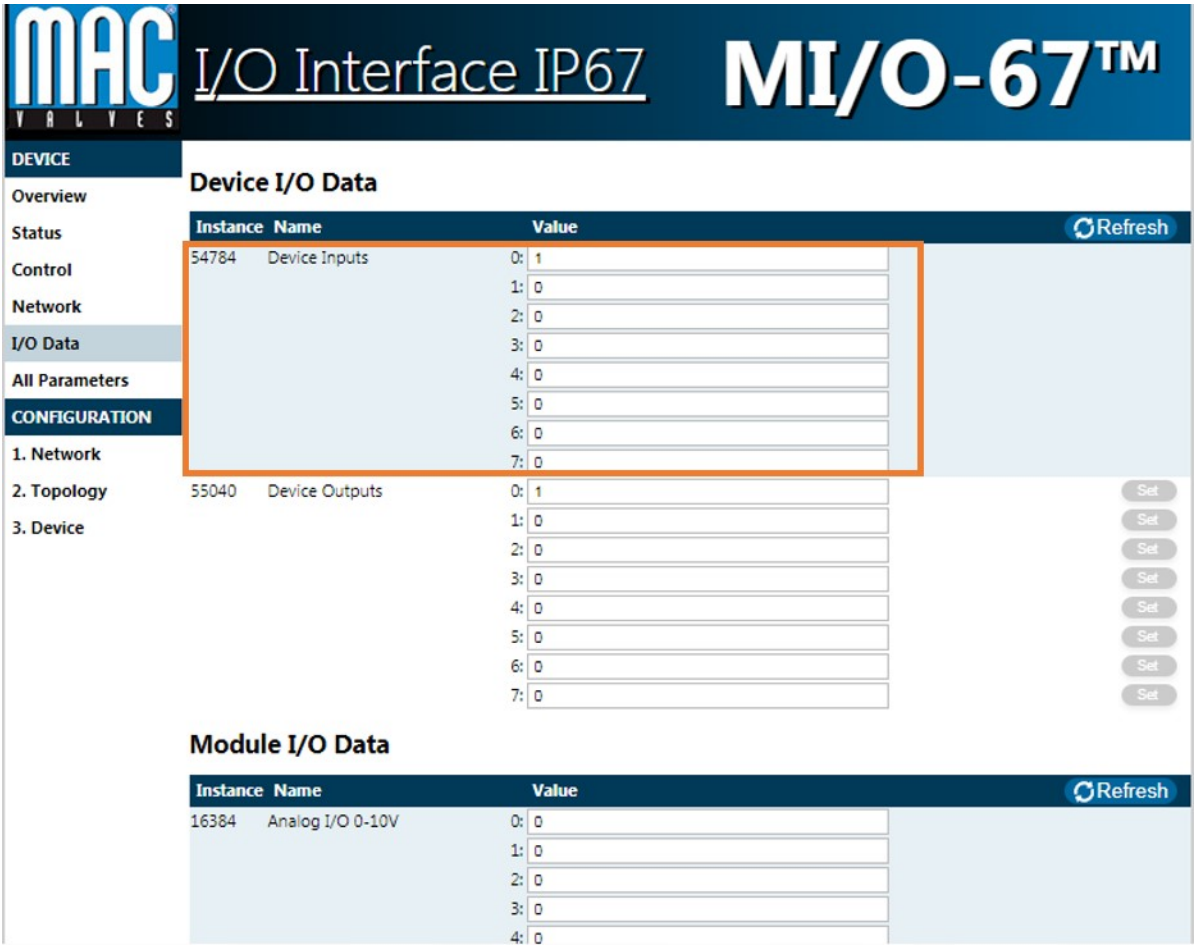
01 00 00 00 00 00 00 would enable the Open Load Detect on only solenoid 1.
02 00 00 00 00 00 00 would enable the Open Load Detect on only solenoid 2.
03 00 00 00 00 00 00 would enable the Open Load Detect on solenoids 1 and 2.
04 00 00 00 00 00 00 would enable the Open Load Detect on only solenoid 3.
0c 00 00 00 00 00 00 would enable the Open Load Detect on solenoids 3 and 4.
10 00 00 00 00 00 00 would enable the Open Load Detect on only solenoid 5.
FF 00 00 00 00 00 00 would enable the Open Load Detect on solenoids 1-8 only

00 01 00 00 00 00 00 would enable the Open Load Detect on only solenoid 9
FF 00 00 00 00 00 would enable the Open Load Detect on solenoids 1-16
00 00 01 00 00 00 00 00 would enable the Open Load Detect on only solenoid 17.
00 00 00 01 00 00 00 00 would enable the Open Load Detect on only solenoid 25.

The other positions are for future use.
The **Open Load Detect** is triggered if the **Open Load Detect** is enabled on that channel, the valve channel is turned off, and there is either an open coil or no valve installed.
Short Circuit (talked about later) is always on and triggered when the valve channel is turned on and there is a high circuit detected on that channel.

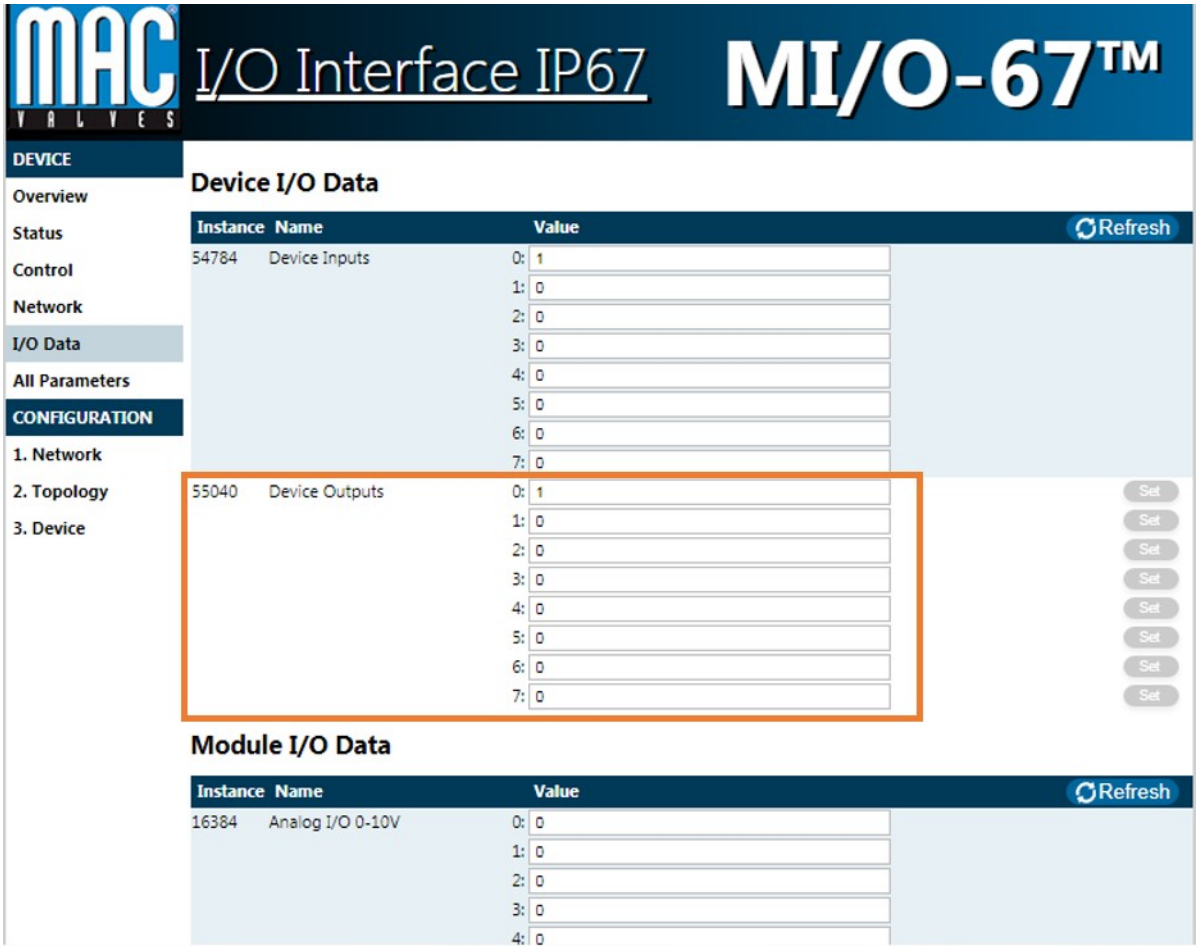
1.3.5 Device I/O Data Tab

This tab will allow you to read inputs and actively turn on and turn off valves and outputs:



In the **Device I/O Data** section, manifold valves can be operated plus the Open Load Detect and Short Circuit Detect can be observed. These are in binary coded decimal format.

The **Device Inputs** section (highlighted in blue) is divided into 8 sections (0-7). The functions of these sections are:
0: Mirrors command for solenoids 1-16
1: Mirrors command for solenoids 17-32
2: Short Circuit Detect for solenoids 1-16 (high if short on channel)
3: Short Circuit Detect for solenoids 17-32 (high if short on channel)
4: Open Load Detect for solenoids 1-16 (high if open on channel)
5: Open Load Detect for solenoids 17-32 (high if open on channel)
6: Mirror for Open Load Detect configuration solenoids 1-16 (see section 1.3.4 above)
7: Mirror for Open Load Detect configuration solenoids 17-32 (see section 1.3.4 above)



The **Device Outputs** section is also divided into 8 sections (0-7). The functions of these sections are:
0: Command for solenoids 1-16
1: Command for solenoids 17-32
2: Reserved
3: Reserved
4: Reserved
5: Reserved
6: Reserved
7: Reserved

In this example, we are energizing the first solenoid shown in Device Outputs, 0: 1. This is a binary coded decimal meaning the second solenoid would be "2", the third solenoid would be "4", and the fourth solenoid would be "8"…etc., up to 65535. Output 1 would be the next 16 solenoids etc. **See Appendix A for conversion.**

For example, if the first sixteen channels are **Open Load Detect** enabled and there is an open on channel 16, then word 4: would be 32768 and word 5: would be 0 when all of the channels are de-energized.

Another function with the valve drivers is the **Short Circuit Detect**. This does not have to be enabled and will toggle a bit in words 2: and 3: if a short was found in valve channels 1-32 during energization of that channel. For example, if valve channel 4 has a short and the channel is energized, then, word 2: would show 8 and word 3: would show 0.

1.3.6 Device Control Tab

This tab allows you to reset the various parts of the code.

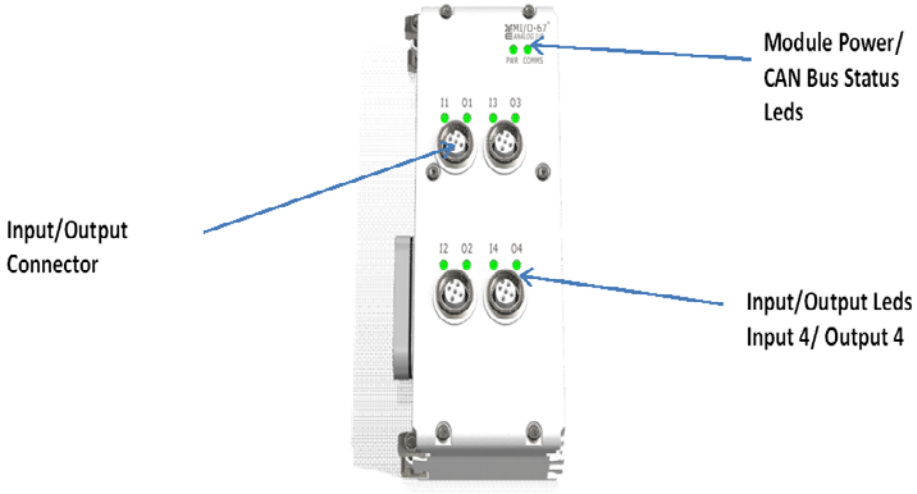
2. Web Configurator Additional Information

For future use

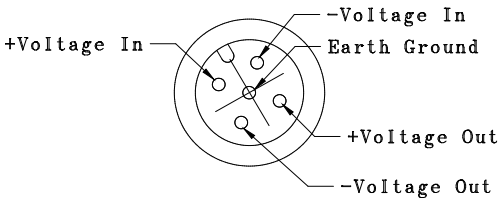
3. Analog I/O Module (0-10V)

Shown below is the Analog Module. This module has four inputs (0-10V) and four outputs (0-10V) on four M12 connectors. Each connector has one input and one output.

Analog Module, Voltage



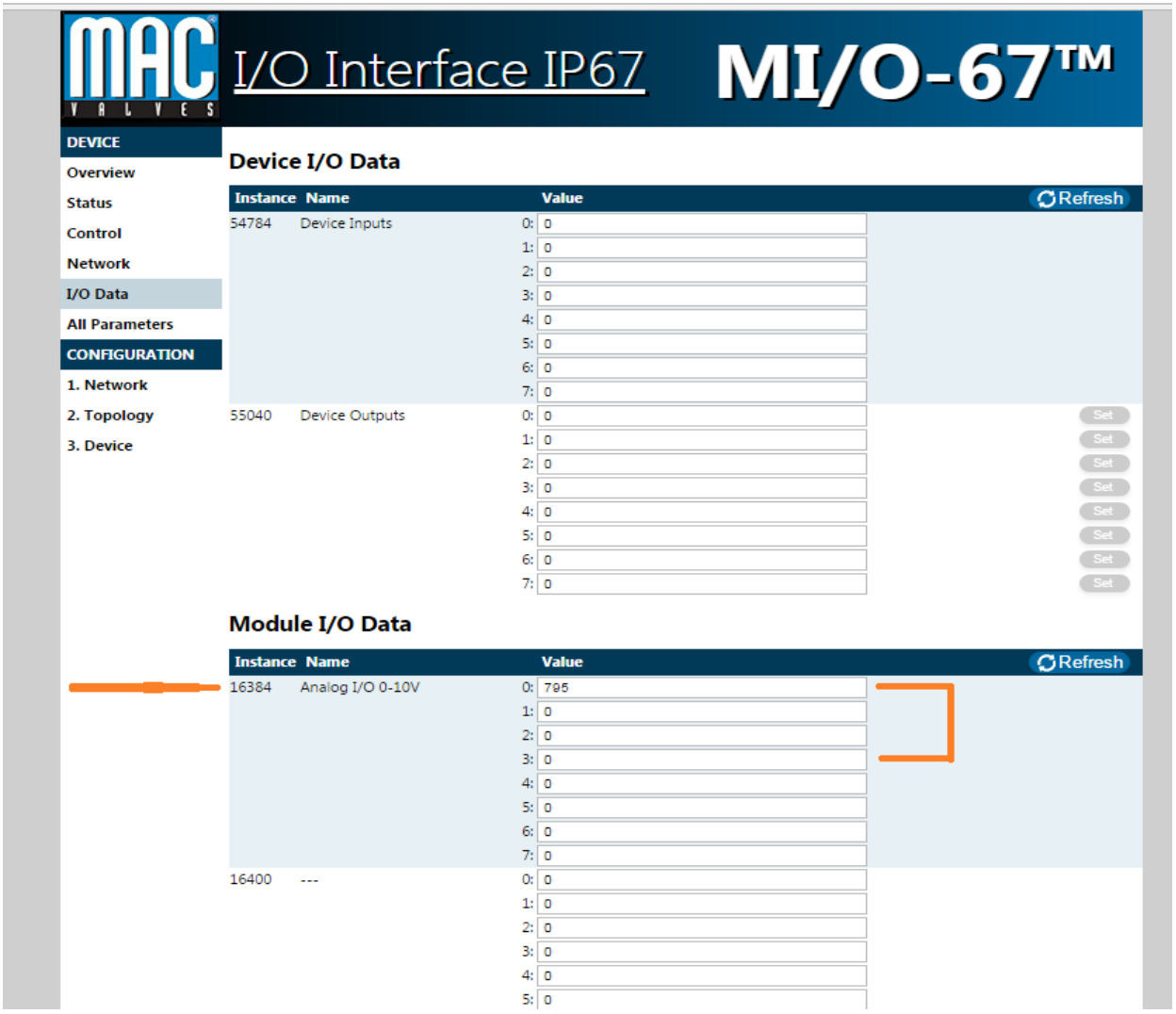
The pin output for the connectors is shown below.



To read inputs, and drive outputs with the Web Configurator, open the **I/O Data** section of the program. There, you will see two groups of data labeled Analog I/O 0-10V. The first one, Instance **16384**, will read 0-10V as 0-1800 on the data chart. You must refresh the screen, every time the data changes. 0: is for Input 1 (connector 1,I1), 1: is for Input 2 (connector 2,I2), 2: is for Input 3 (connector 3, I3), and 3: is for Input 4 (connector 4,I4).

Shown below is an input on connector 1 (Input 1, byte 0:) of 4.4V (read in as binary coded decimal value of 795).

Also note that if the input voltage on the pin is above 11.5V, the channel LED which is normally green, will turn to red.

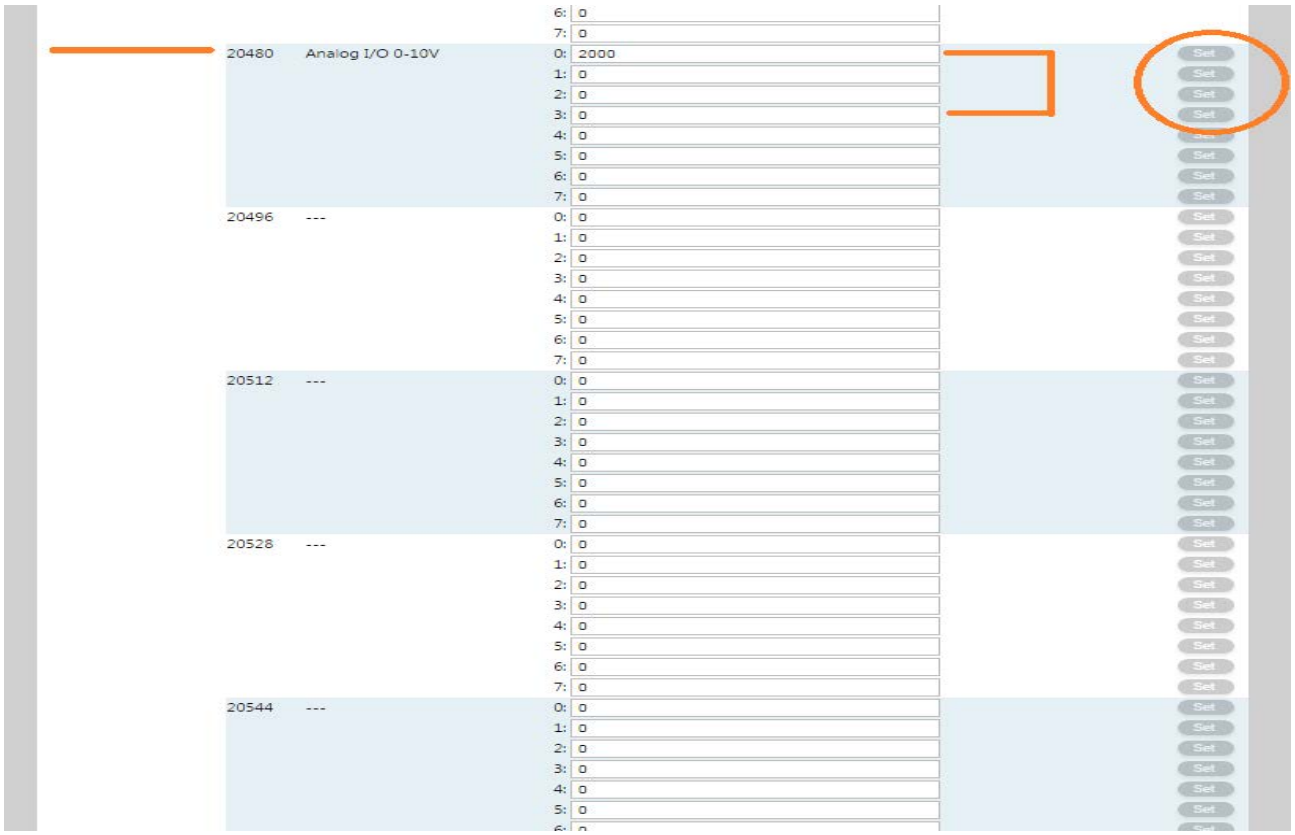

I/O Interface IP67
MI/O-67™
DEVICE
Overview
Status
Control
Network
I/O Data
All Parameters
CONFIGURATION
1. Network
2. Topology
3. Device
Device I/O Data
Instance Name Value Refresh
54784 Device Inputs 0: 0 1: 0 2: 0 3: 0 4: 0 5: 0 6: 0 7: 0
55040 Device Outputs 0: 0 1: 0 2: 0 3: 0 4: 0 5: 0 6: 0 7: 0
Set
Module I/O Data
Instance Name Value Refresh
16384 Analog I/O 0-10V 0: 795 1: 0 2: 0 3: 0 4: 0 5: 0 6: 0 7: 0
16400 --- 0: 0 1: 0 2: 0 3: 0 4: 0 5: 0

To operate outputs, there is a second data section further down the page in Instance 20480. It too is labeled Analog I/O 0-10V.

To drive an output with 0-10V, type in to the data area 0-4000. Next select "Set" and the value will be outputted to the corresponding pin.

Similar to the inputs, the outputs are connector 1, (Output 1,O1), use 0:, connector 2, (Output 2,O2), use 1:, connector 3, (Output 3,O3), use 2:, and connector 4, (Output 4,O4) use 3:.

Shown below is an output of 5V being sent to connector 1, O1 as binary coded decimal value of 2000.



4. Valve Driver

For future use.

5. Analog I/O Module (4-20mA)

For future use.

6. Digital I/O

For future use.

Appendix A

The following is a conversion chart for the solenoids and numeric addresses.

Numeric Equivalent Table

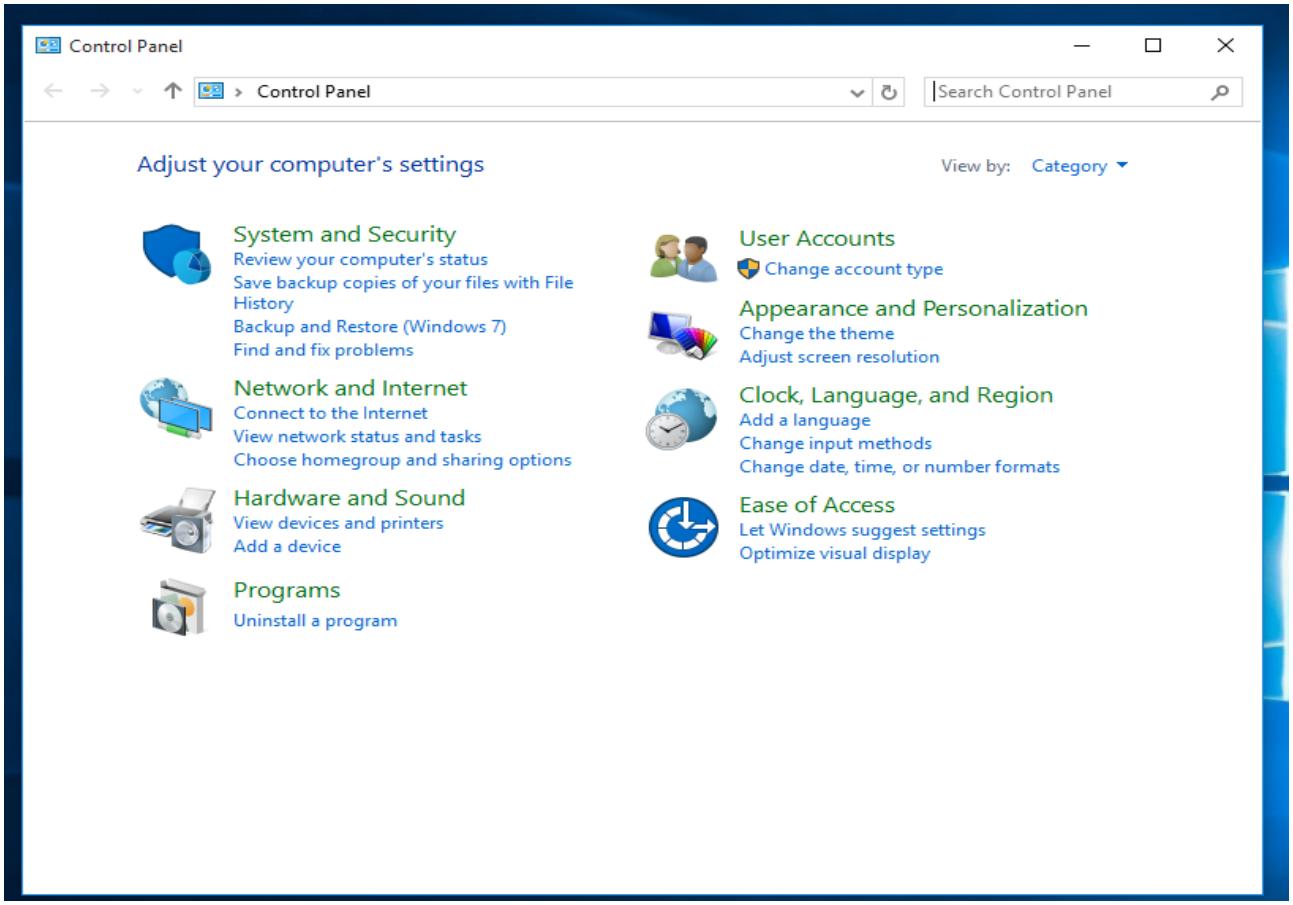
Decimal	Binary	Hexadecimal	Solenoid
0	0b00000000	0x00	Off
1	0b00000001	0x01	1
2	0b00000010	0x02	2
3	0b00000011	0x03	1,2
4	0b00000100	0x04	3
5	0b00000101	0x05	1,3
6	0b00000110	0x06	2,3
7	0b00000111	0x07	1,2,3
8	0b00001000	0x08	4
9	0b00001001	0x09	1,4
10	0b00001010	0x0a	2,4
11	0b00001011	0x0b	1,2,4
12	0b00001100	0x0c	3,4
13	0b00001101	0x0d	1,3,4
14	0b00001110	0x0e	2,3,4
15	0b00001111	0x0f	1,2,3,4
16	0b00010000	0x10	5
…			
…			
65532	0b11111100	0xfc	3,4,5,6,7,8
65533	0b11111101	0xfd	1,3,4,5,6,7,8
65534	0b11111110	0xfe	2,3,4,5,6,7,8
65535	0b11111111	0xff	1,2,3,4,5,6,7,8

Note: To operate all of the solenoids possible on the stack, it will require a total of 4 bytes (3 more of the above).

Appendix B

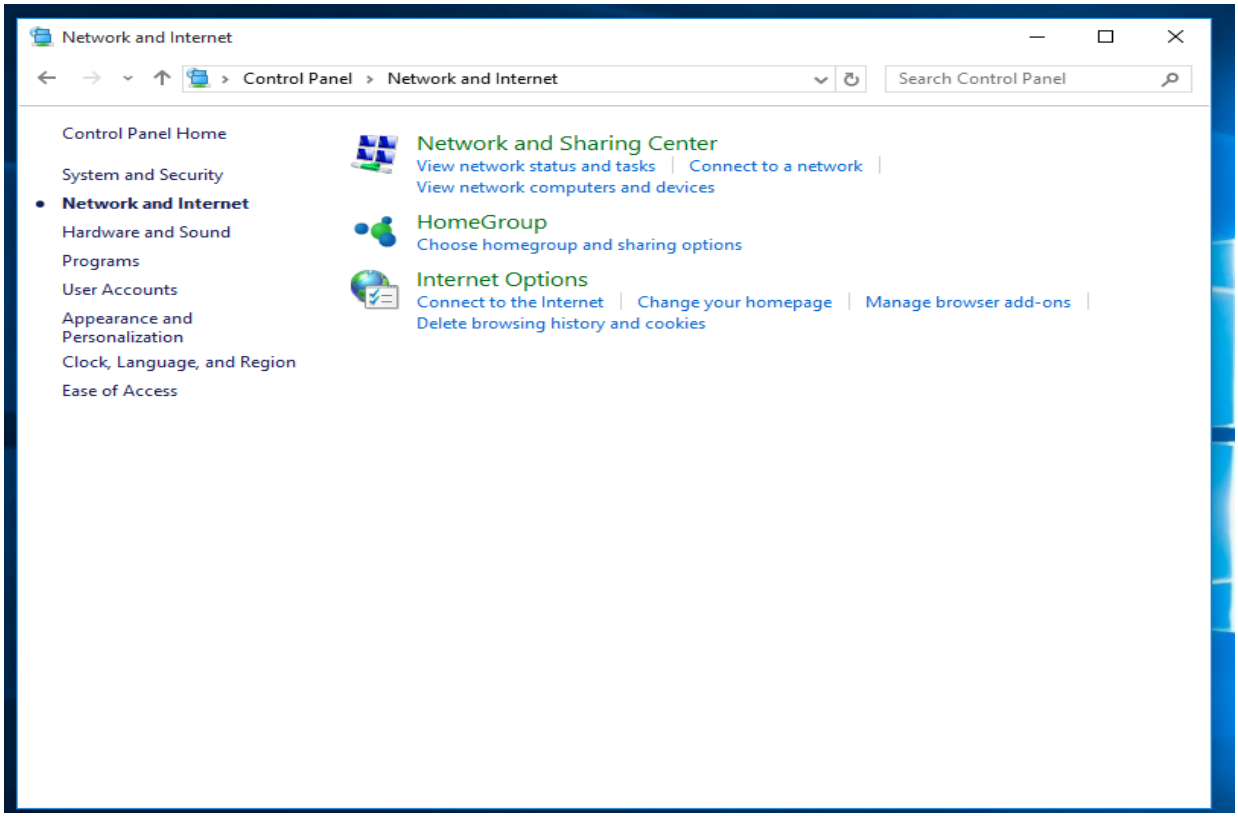
This process is for a Windows 10 machine. Windows 7/8 will be slightly different but the route will be similar.

First, select the Control Panel App as shown below:



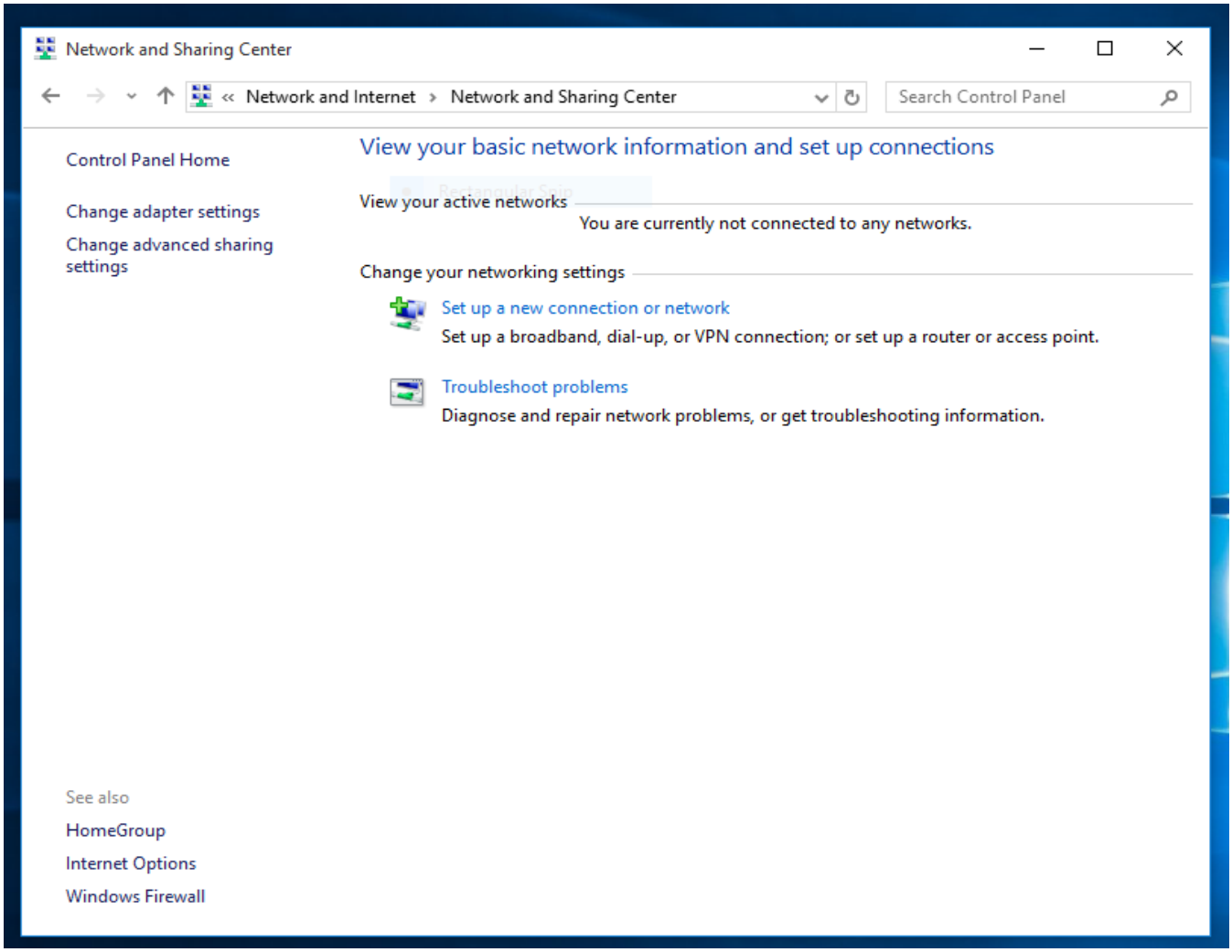
Appendix B – cont.

Inside the Control Panel App, select Network and Internet. A screen will appear that looks like the one below. From there, select Network and Sharing Center:



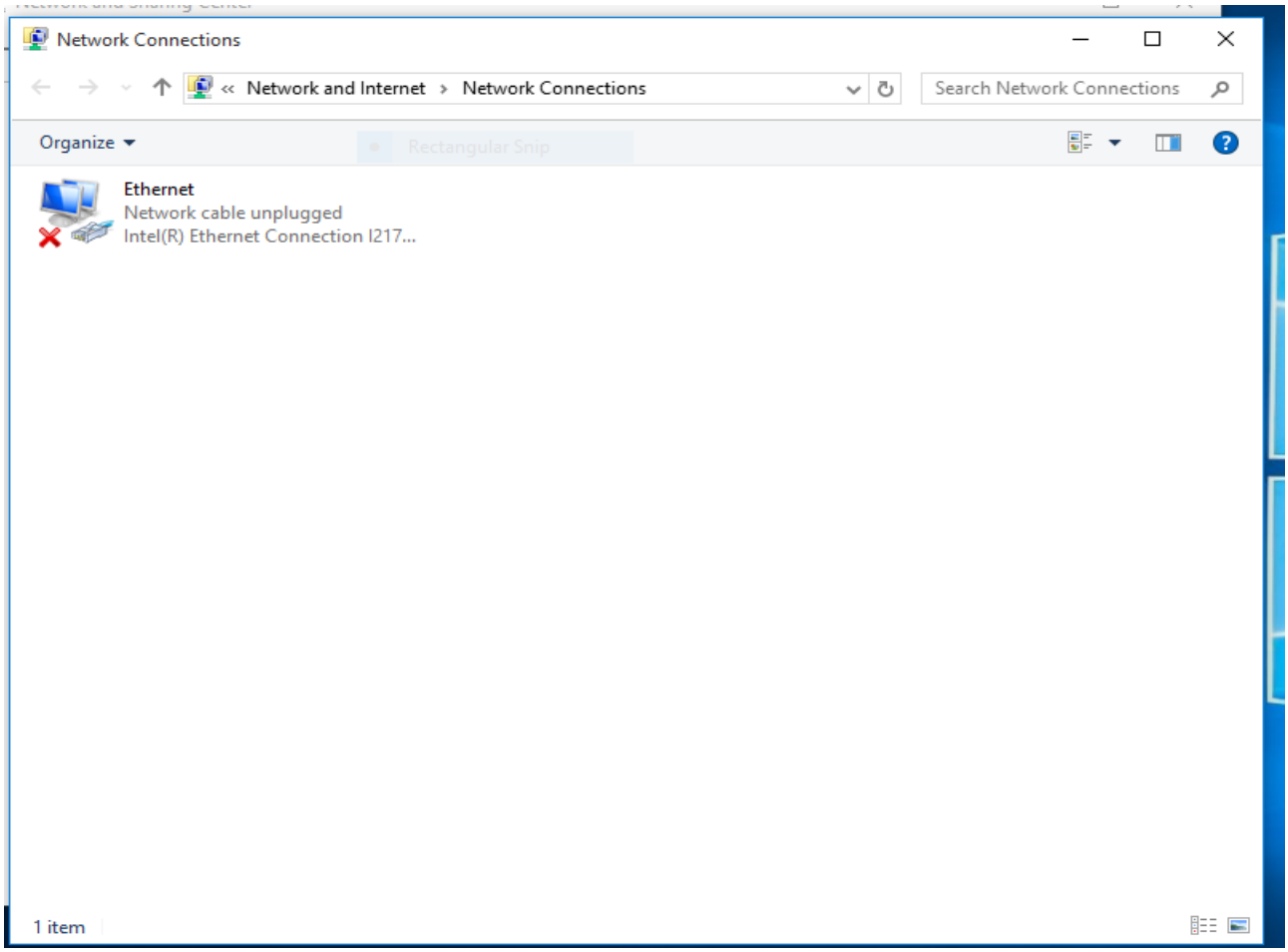
Appendix B – cont.

Inside the Network and Sharing Center, on the left hand side, select Change Adapter Settings:



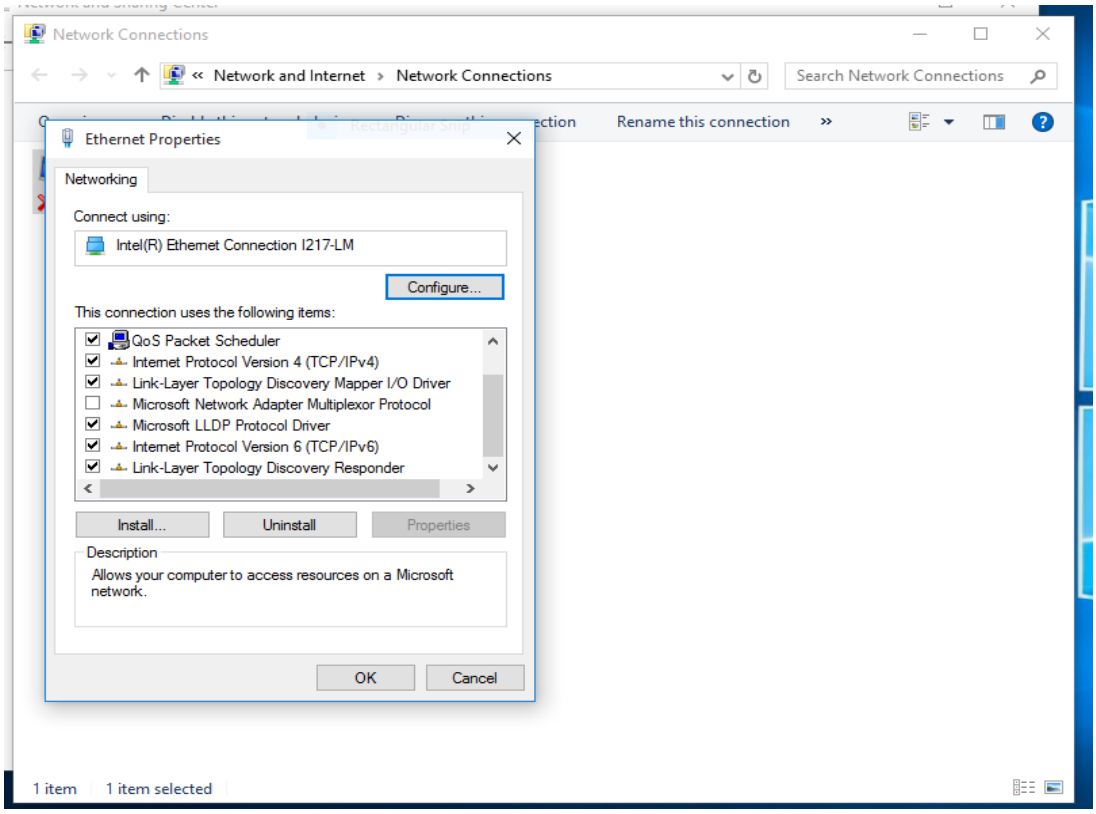
Appendix B – cont.

Right mouse click the EtherNet adapter which is going to be used. Note in our example, there is nothing connected to the EtherNet port, so there is a red **X** by the adapter icon. If the MI/O-67 was connected and powered, the red **X** would disappear.



Appendix B – cont.

Select Internet Protocol Version 4 (TCP/IPv4).

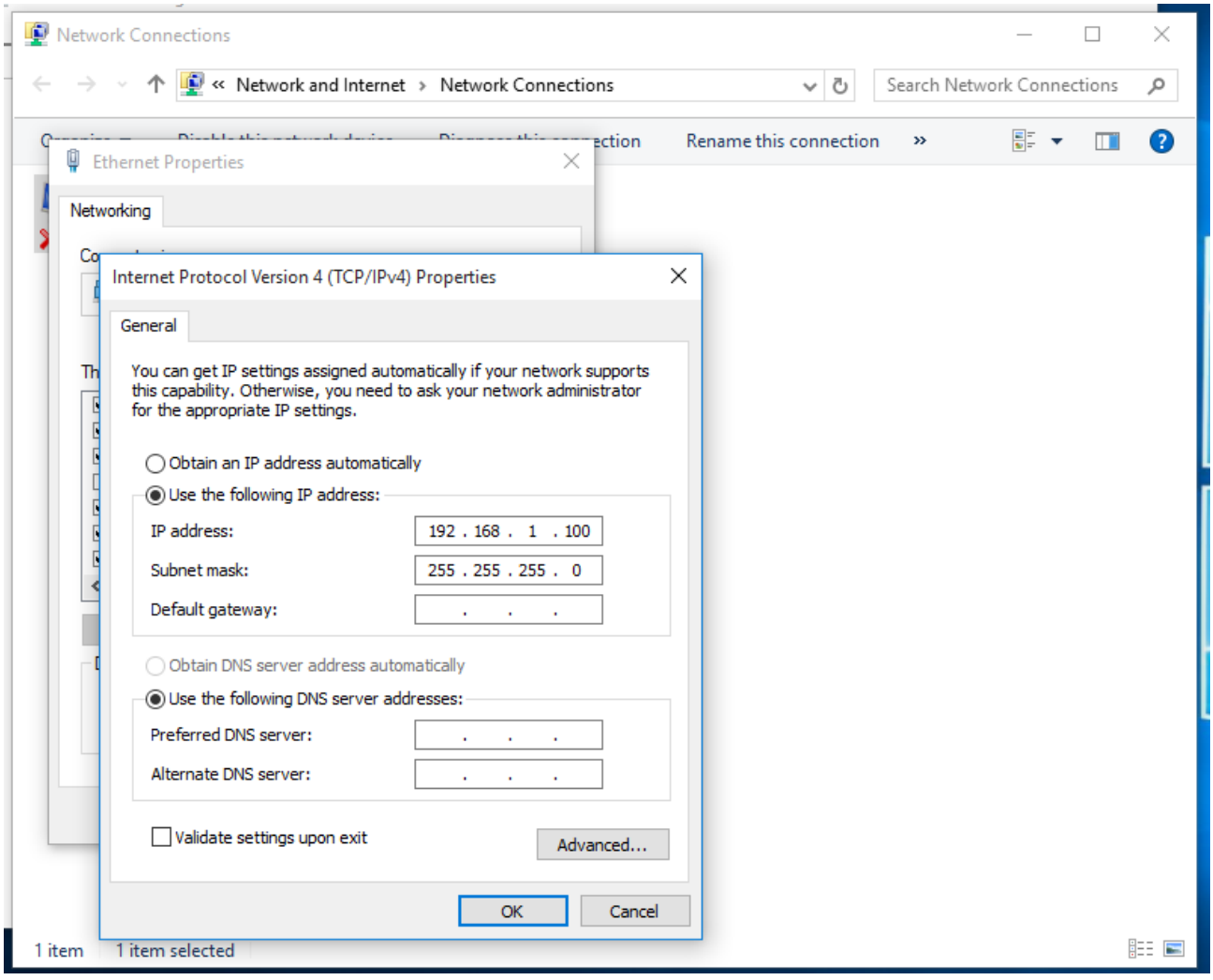


The Properties icon will appear (not greyed out). Select Properties.

Appendix B – cont.

From there, a window will appear similar to the one below. Select Use the Following IP Address. Type in the IP Address for the master. We used 192.168.1.100 for our example because the MI/O-67 factory default IP Address is 192.168.1.25. You cannot share the same IP Address on a given network.

Next, type in the Subnet Mask. The number 255 means that octet has to match exactly with the slave IP Address, 0 means it cannot match. For our example in the first octet, 192 (Master) must also be 192 (Slave), 168 (Master) must also be 168 (Slave), 1 (Master) must also be 1 (Slave), and the Master is 100 the Slave is 25.



Warning:

Under no circumstances are MAC Valves to be used in any application or system where failure of the valves or related components to operate as intended could result in injury to the operator or any other person.

- Do not operate outside of prescribed pressure or temperature ranges.
- Air supply must be clean. Contamination of valve can affect proper operation.
- Before attempting to perform any service on valve, consult catalog, P & O sheet, or factory for proper maintenance procedures. Never attempt service with air pressure to valve.
- If air line lubrication is used, consult catalog, P & O sheet, or factory for recommended lubricants.
- Before interfacing the product to any bus or serial system, consult the controller and bus manuals for proper usage.